SPORTSTER
TROUBLESHOOTING
MANUAL

Begin any troubleshooting procedure by defining the symptoms as precisely as possible. Gather as much information as possible to aid diagnosis. Never assume anything and do not overlook the obvious. Make sure there is fuel in the tank, and the fuel valve is in the on position. Make sure the engine stop switch is in the run position and the spark plug wires are attached to the spark plugs.

If a quick check does not reveal the problem, turn to the troubleshooting procedures described in this chapter. Identify the procedure that most closely describes the symptoms, and perform the indicated tests.

In most cases, expensive and complicated test equipment is not needed to determine whether repairs can be performed at home. A few simple checks could prevent an unnecessary repair charge. On the other hand, be realistic and do not attempt repairs beyond your capabilities. Many service departments will not take work that involves the assembly of damaged or abused equipment. If they do, expect the cost to be high.

Refer to Tables 1-3, at the end of this chapter, for electrical specifications and diagnostic trouble codes.

ENGINE OPERATING
REQUIREMENTS

An engine needs three basics to run properly: correct air/fuel mixture, compression and a spark at the right time. If one basic requirement is missing, the engine will not run. Refer to Figure 1 for four-stroke engine operating principles.

ENGINE STARTING

Engine Fails to Start (Spark Test)

Perform the following spark test to determine if the ignition system is operating properly:

CAUTION
Before removing the spark plugs in Step 1, clean all dirt and debris away from the plug base. Dirt that falls into the cylinder causes rapid engine wear.

1. Disconnect the spark plug wire and remove the spark plug as described in Chapter Three.

NOTE
A spark tester is a useful tool for testing spark output. Figure 2 shows the Motion Pro Ignition System Tester (part No. 08-0122). This tool is inserted in the spark plug cap and its base is grounded against the cylinder head. The tool’s air gap is adjustable, and it allows the visual inspection
FOUR-STROKE ENGINE OPERATING PRINCIPLES

1. INTAKE
   Intake valve opens as piston begins downward, drawing air/fuel mixture into the cylinder, through the valve.

2. COMPRESSION
   Intake valve closes and piston rises in cylinder, compressing air/fuel mixture.

3. POWER
   Spark plug ignites compressed mixture, driving piston downward. Force is applied to the crankshaft causing it to rotate.

4. EXHAUST
   Exhaust valve opens as piston rises in cylinder, pushing spent gases out through the valve.
of the spark. This tool is available at motorcycle repair shops.

2. Cover the spark plug hole with a clean shop cloth to reduce the chance of gasoline vapors being emitted from the hole.

3. Insert the spark plug (Figure 3), or spark tester (Figure 4), into its plug cap and ground the spark plug base against the cylinder head. Position the spark plug so the electrode is visible.

   **WARNING**
   Mount the spark plug, or tester, away from the spark plug hole in the cylinder so the spark plug or tester cannot ignite the gasoline vapors in the cylinder. If the engine is flooded, do not perform this test. The firing of the spark plug can ignite fuel that is ejected through the spark plug hole.

4. Turn the ignition switch on.

   **WARNING**
   Do not hold the spark plug, wire or connector, or a serious electrical shock may result.

5. Turn the engine over with the starter. A crisp blue spark should be evident across the spark plug electrode or spark tester terminals. If there is strong sunlight on the plug, shade the plug to better see the spark.

6. If the spark is good, check for one or more of the following possible malfunctions:
   a. Obstructed fuel line or fuel filter.
   b. Low compression or engine damage.
   c. Flooded engine.
   d. Incorrect ignition timing.

   **NOTE**
   If the engine backfires during starting, the ignition timing may be incorrect due to a defective ignition component. Refer to Ignition Timing in Chapter Three.

7. If the spark is weak or if there is no spark, refer to Engine is Difficult to Start in this section.

**Engine is Difficult to Start**

Check for one or more of the following possible malfunctions:
1. Fouled spark plug(s).
2. Improperly adjusted enrichment valve.
3. Intake manifold air leak.
4. Plugged fuel tank filler cap.
5. Clogged fuel line.

6. Contaminated fuel system.
7. Improperly adjusted carburetor.
8. Defective ignition module.
9. Defective ignition coil.
10. Damaged ignition coil primary and/or secondary wires.
11. Incorrect ignition timing.
12. Low engine compression.
13. Discharged battery.
15. Loose or corroded starter and/or battery cables.
16. Loose ignition sensor and module electrical connector.
17. Incorrect pushrod length (intake and exhaust valve pushrods interchanged).

**Engine Does Not Crank**

Check for one or more of the following possible malfunctions:
1. Ignition switch turned off.
2. Faulty ignition switch.
3. Engine run switch in off position.
4. Defective engine run switch.
5. Loose or corroded starter and battery cables (solenoid chatters).
6. Discharged or defective battery.
7. Defective starter.
8. Defective starter solenoid.
10. Slipping overrunning clutch assembly.
11. Seized piston(s).

**ENGINE PERFORMANCE**

If the engine runs, but is not operating at peak performance, refer to the following as a starting point from which to isolate a performance malfunction.

**Spark Plugs Fouled**

1. Severely contaminated air filter element.
2. Incorrect spark plug heat range. Refer to Chapter Three.
4. Worn or damaged piston rings.
5. Worn or damaged valve guide oil seals.
7. Incorrect carburetor float level.

**Engine Misfire**

1. Fouled or improper spark plug gap.
2. Damaged spark plug cables.
3. Incorrect ignition timing.
4. Defective ignition components.
5. Obstructed fuel line or fuel shutoff valve.
6. Obstructed fuel filter.
7. Clogged carburetor jets.
8. Loose battery connection.
9. Wiring or connector damage.
10. Water or other contaminates in the fuel.
11. Weak or damaged valve springs.
12. Incorrect camshaft/valve timing.
13. Damaged valve(s).
15. Intake manifold or carburetor air leak.
17. Plugged fuel tank vent system.

**Engine Overheating**

1. Incorrect carburetor adjustment or jet selection.
2. Incorrect ignition timing or defective ignition system components.
3. Improper spark plug heat range. Refer to Chapter Three.
4. Damaged or blocked cooling fins.
5. Low oil level.
6. Oil not circulating properly.
7. Leaking valves.
8. Heavy combustion chamber carbon deposits.

**Engine Runs Rough with Excessive Exhaust Smoke**

1. Clogged air filter element.
2. Rich carburetor adjustment.
3. Choke not operating correctly.
4. Water or other fuel contaminants.
5. Clogged fuel line and/or filter.
6. Spark plug(s) fouled.
7. Defective ignition coil.
8. Defective ignition module or sensor(s).
9. Loose or defective ignition circuit wire.
10. Short circuits from damaged wire insulation.
11. Loose battery cable connections.
12. Incorrect camshaft/valve timing.
13. Intake manifold or air filter air leak.

**Engine Lacks Power**

1. Incorrect carburetor adjustment.
2. Clogged fuel line.
3. Incorrect ignition timing.
4. Dragging brake(s).
5. Engine overheating.
6. Incorrect ignition timing.
7. Incorrect spark plug gap.
Valve Train Noise

1. Bent pushrod(s).
2. Defective hydraulic lifter(s).
3. Bent valve(s).
4. Rocker arm seizure or damage (binding on shaft).
5. Worn or damaged camshaft gear bushing(s).
6. Worn or damaged camshaft gear(s).

STARTING SYSTEM

The starting system consists of the battery, starter, starter relay, solenoid, start button, and related wiring.

When the ignition switch is turned on and the start button is pushed in, current is transmitted from the battery to the starter relay. When the relay is activated, it activates the starter solenoid that mechanically engages the starter with the engine.

Starting system problems are most often related to a loose or corroded electrical connection.

Refer to Figure 5 for starter and solenoid terminal identification.

Troubleshooting Preparation

Before troubleshooting the starting system, check for the following:
1. The battery is fully charged.
2. Battery cables are the proper size and length. Replace damaged or undersized cables.
3. All electrical connections are clean and tight. High resistance caused from dirty or loose connectors can affect voltage and current levels.
4. The wiring harness is in good condition, with no worn or frayed insulation or loose harness sockets.
5. The fuel tank is filled with an adequate supply of fresh gasoline.
6. The spark plugs are in good condition and properly gapped.
7. The ignition system is working correctly.

Voltage Drop Test

Prior to performing procedures in the Starter Testing section, perform a voltage drop test.
1. To check voltage drop in the solenoid circuit, connect the positive voltmeter lead to the positive battery terminal. Connect the negative voltmeter lead to the solenoid terminal (Figure 6).
2. Turn the ignition switch on and push the starter button while reading the voltmeter scale. Note the following:
a. The circuit is operating correctly if the voltmeter reading is 1.0 volt or less. A voltmeter reading of 12 volts indicates an open circuit.

b. A voltage drop of more than 1.0 volt indicates a problem in the solenoid circuit.

c. If the voltage drop reading is correct, continue with Step 3.

3. To check the starter ground circuit, connect the negative voltmeter lead to the negative battery terminal. Connect the positive voltmeter lead to the starter housing (Figure 7).

4. Turn the ignition switch on and push the starter button while reading the voltmeter scale. The voltage drop must not exceed 0.2 volt. If it does, check the ground connections between the meter leads.

5. If the problem is not found, refer to the Starter Testing section.

NOTE
Step 3 and Step 4 check the voltage drop across the starter ground circuit. To check any ground circuit in the starting circuit, repeat this test and leave the negative voltmeter lead connected to the battery and connect the positive voltmeter lead to the ground in question.

Starter Testing

CAUTION
Never operate the starter for more than 30 seconds at a time. Allow the starter to cool before reusing it. Failing to allow the starter to cool after continual starting attempts can damage the starter.

The basic starter-related troubles are:
1. Starter does not spin.
2. Starter spins but does not engage.
3. The starter does not disengage after the start button is released.
4. Loud grinding noises when starter turns.
5. Starter stalls or spins too slowly.

Starter does not spin

1. Turn the ignition switch on and push the starter button while listening for a click at the starter relay. Turn the ignition switch off and note the following:
   a. If the starter relay clicks, test the starter relay as described in this section. If the starter relay test readings are correct, continue with Step 2.
   b. If the solenoid clicks, go to Step 3.
   c. If there was no click, go to Step 5.

2. Check the wiring connectors between the starter relay and solenoid. Note the following:
   a. Repair any dirty, loose-fitting or damaged connectors or wiring.
   b. If the wiring is in good condition, remove the starter as described in Chapter Nine. Perform the solenoid and starter bench tests as described in this section.

3. Perform a voltage drop test between the battery and solenoid terminals as described in Voltage Drop Test in this section. The normal voltage drop is less than 1.0 volt. Note the following:
   a. If the voltage drop is less than 1.0 volt, perform Step 4.
   b. If the voltage drop is more than 1.0 volt, check the solenoid and battery wires and connections for dirty or loose fitting terminals; clean and repair as required.

4. Remove the starter as described in Chapter Nine. Momentarily connect a fully charged 12-volt battery to the
starter as shown in Figure 8. If the starter is operational, it will turn when connected to the battery. Disconnect the battery and note the following:

a. If the starter turns, perform the solenoid pull-in and hold-in tests as described in Solenoid Testing (Bench Tests) in this section.

b. If the starter does not turn, disassemble the starter as described in Chapter Nine, and check it for opens, shorts and grounds.

5. If there is no click when performing Step 1, measure voltage between the starter button and the starter relay. The voltmeter must read battery voltage. Note the following:

a. If there is battery voltage, continue with Step 6.

b. If there is no voltage, go to Step 6.

6. Check for voltage at the starter button. Note the following:

a. If there is voltage at the starter button, test the starter relay as described in this section.

b. If there is no voltage at the starter button, check continuity across the starter button. If there is voltage leading to the starter button, but no voltage leaving the starter button, replace the button switch and retest. If there is no voltage leading to the starter button, check the starter button wiring for dirty or loose-fitting terminals or damaged wiring; clean and/or repair as required.

Starter spins but does not engage

If the starter spins but the pinion gear does not engage the clutch shell ring gear, perform the following:

1. Remove the primary drive cover as described in Chapter Six.

2. Check the starter pinion gear (A, Figure 9). If the teeth are chipped or worn, inspect the clutch shell ring gear (B, Figure 9) for the same problems. Note the following:

a. If the starter pinion gear or clutch ring gear is damaged, service the parts.

b. If the starter pinion gear and clutch shell ring gear are not damaged, continue with Step 3.

c. Make sure the pinion does not run in overrunning direction.

3. Remove and disassemble the starter as described in Chapter Nine. Then check the overrunning clutch assembly (Figure 10 and Figure 11) components for wear and/or damage:

a. Rollers (Figure 12).

b. Compression spring (A, Figure 13).

c. Pinion teeth.

d. Clutch shaft splines (B, Figure 13).

4. Replace worn or damaged parts as required.
Starter does not disengage after releasing the start button

1. A sticking solenoid, caused by a worn solenoid compression spring (A, Figure 13), can cause this problem. Replace the solenoid if damaged.

2. On high-mileage motorcycles, the starter pinion gear (A, Figure 9) can jam on a worn clutch ring gear (B). Unable to return, the starter will continue to run. This condition usually requires ring gear replacement.

3. Check the start button switch and starter relay for internal damage. Test the start switch as described in Chapter Eight. Test the starter relay as described in this chapter.

Loud grinding noises when the starter turns

Incorrect starter pinion gear and clutch shell ring gear engagement (B, Figure 9) or a broken overrunning clutch mechanism (Figure 11) can cause this problem. Remove and inspect the starter as described in Chapter Nine.

Starter stalls or spins too slowly

1. Perform a voltage drop test between the battery and solenoid terminals as described under Voltage Drop Test in this section. The normal voltage drop is less than 1.0 volt. Note the following:
   a. If the voltage drop is less than 1.0 volt, continue with Step 2.
   b. If the voltage drop exceeds 1.0 volt, check the solenoid and battery wires and connections for dirty or loose-fitting terminals; clean and repair as required.

2. Perform a voltage drop test between the solenoid terminals and the starter. The normal voltage drop is less than 1.0 volt. Note the following:
   a. If the voltage drop is less than 1.0 volt, continue with Step 3.
   b. If the voltage drop exceeds 1.0 volt, check the solenoid and starter wires and connections for dirty or loose-fitting terminals; clean and repair as required.

3. Perform a voltage drop test between the battery ground wire and the starter as described under Voltage Drop Test in this section. The normal voltage drop is less than 0.2 volt. Note the following:
   a. If the voltage drop is less than 0.2 volt, continue with Step 4.
   b. If the voltage drop exceeds 0.2 volt, check the battery ground wire connections for dirty or loose-fitting terminals; clean and repair as required.

4. Refer to Starter Current Draw Testing in this section and perform the first test. Note the following:
   a. If the current draw is excessive, check for a damaged starter. Remove the starter as described in Chapter Nine and perform the second test.
   b. If the current draw reading is correct, continue with Step 5.

5. Remove the primary cover as described in Chapter Six. Check the starter pinion gear (A, Figure 9). If the teeth are chipped or worn, inspect the clutch ring gear (B, Figure 9) for the same problem.
a. If the starter pinion gear or clutch ring gear is damaged, service it.
b. If the starter pinion gear and clutch ring gear are not damaged, continue with Step 6.

6. Remove and disassemble the starter as described in Chapter Nine. Check the disassembled starter for opens, shorts and grounds.

**Starter Current Draw Testing**

A short circuit in the starter or a damaged pinion gear assembly can cause excessive current draw. If the current draw is low, suspect an undercharged battery or an open circuit in the starting circuit.

Refer to Table 1 for current draw specifications.

---

**Starter installed**

This test requires a fully charged battery and an inductive ammeter.

1. Shift the transmission into neutral.
2. Disconnect the two spark plug caps from the spark plugs. Then ground the plug caps with two extra spark plugs. Do not remove the spark plugs from the cylinder heads.
3. Connect an inductive ammeter between the battery terminal and positive battery terminal (Figure 14). Connect a jumper cable from the negative battery terminal to ground.
4. Turn the ignition switch on and press the start button for approximately ten seconds. Note the ammeter reading.

**NOTE**
The current draw is high when the start button is first pressed, then it will drop and stabilize at a lower reading. Refer to the lower stabilized reading during this test.

5. If the current draw exceeds the specification in Table 1, check for a defective starter or starter drive mechanism. Remove and service these components as described in Chapter Nine.
6. Disconnect the ammeter and jumper cables.

**Starter removed**

This test requires a fully charged 12-volt battery, an inductive ammeter, a jumper wire (14-gauge minimum) and three jumper cables (6-gauge minimum).

Refer to Figure 15.
1. Remove the starter as described in Chapter nine.
4. Connect a jumper cable (6-gauge minimum) between the positive battery terminal and the ammeter.
5. Connect the second jumper cable between the ammeter and the battery terminal on the starter solenoid.
6. Connect the third jumper cable between the battery ground terminal and the starter mounting flange.
7. Read the ammeter and refer to the maximum no-load current specification in Table 1. A damaged pinion gear assembly will cause an excessively high current draw reading. If the current draw reading is low, check for an undercharged battery, or an open field winding or armature in the starter.

Solenoid Testing (Bench Tests)

This test requires a fully charged 12-volt battery and three jumper wires.

1. Remove the starter as described in Chapter Nine.

   NOTE
   The solenoid (A, Figure 16) must be installed on the starter during the following tests.

2. Disconnect the field wire (B, Figure 16) from the solenoid before performing the following tests. Insulate the end of the wire terminal so it cannot short out on any of the test connectors.

   CAUTION
   Because battery voltage is being applied directly to the solenoid and starter in the following tests, do not leave the jumper cables connected to the solenoid for more than three-five seconds; otherwise, the voltage will damage the solenoid.

   NOTE
   Thoroughly read the following procedure to become familiar with and understand the procedures and test connections, then perform the tests in the order listed and without interruption.

3. Refer to Figure 17 and perform the solenoid pull-in test as follows:
   a. Connect one jumper wire from the negative battery terminal to the field wire terminal on the solenoid.
   b. Connect one jumper wire from the negative battery terminal to the solenoid housing (ground).
   c. Touch a jumper wire from the positive battery terminal to the starter relay terminal. The pinion shaft (Figure 18) should pull into the housing.
4. To perform the solenoid hold-in test, perform the following:
   a. With the pinion shaft pulled in (Step 3), disconnect the field wire terminal jumper wire from the negative battery terminal and connect it to the positive battery terminal (Figure 19). The pinion shaft should remain in the housing. If the pinion shaft returns to its original position, replace the solenoid.
   b. Leave the jumper wires connected and continue with Step 5.
5. To perform the solenoid return test, perform the following:
   a. Disconnect the jumper wire from the starter relay terminal (Figure 20); the pinion shaft should return to its original position.
   b. Disconnect all the jumper wires from the solenoid and battery.
6. Replace the solenoid if the starter shaft failed to operate as described in Steps 3-5. Refer to Solenoid Replacement in Chapter Nine.

**Starter Relay Test**

Check the starter relay operation with an ohmmeter, jumper wires and a fully charged 12-volt battery.

1. Remove the starter relay as described in Chapter Nine.

   **CAUTION**

   The battery negative lead must be connected to the relay terminal No. 2 to avoid internal diode damage.

2. Connect an ohmmeter and 12-volt battery between the relay terminals as shown in Figure 21. This setup will energize the relay for testing.
3. Check for continuity through the relay contacts using an ohmmeter while the relay coil is energized. The correct reading is 0 ohm. If resistance is excessive or if there is no continuity, replace the relay.
4. If the starter relay passes this test, reinstall the relay.

**CHARGING SYSTEM**

The charging system consists of the battery, alternator and voltage regulator/rectifier.

The alternator generates alternating current (AC) which the rectifier converts to direct current (DC). The regulator maintains the voltage to the battery and load (lights, ignition and accessories) at a constant voltage despite variations in engine speed and load.

A malfunction in the charging system generally causes the battery to remain undercharged.

**Precautions**

Before testing the charging system, observe the following precautions to prevent damage to the system:

1. Never reverse battery connections.
2. Do not short across any connection.
3. Never start the engine with the alternator disconnected from the voltage regulator/rectifier unless instructed to do so during testing.
4. Never start or run the engine with the battery disconnected.
5. Never use a high-output battery charger to help start the engine.

6. Before charging the battery, remove it from the motorcycle as described in Chapter Nine.

7. Never disconnect the voltage regulator/rectifier connector with the engine running. The voltage regulator/rectifier (A, Figure 22) is mounted on the front frame cross member.

8. Do not mount the voltage regulator/rectifier in another location.

9. Make sure the negative battery terminal is connected to the terminal on the engine.

**Troubleshooting Sequence**

If the battery is discharged, perform the following:

1. Test the battery as described in Chapter Nine. Charge the battery if necessary. If the battery does hold a charge while riding, perform the *Charging System Output Test*.

2. If the charging system output is within specification, determine the total amount of current demand by the electrical system and all accessories as described in *Electrical System Current Load Test*.

3. If the charging system output exceeds the current demand and the battery continues to not hold a charge, perform the *Battery Current Draw Test*.

4. If the charging system output is not within specification, test the stator and voltage regulator as described in Chapter Nine.

**Charging System Output Test**

*CAUTION*

When using a load tester, refer to the manufacturer’s instructions. To prevent tester damage caused by overheating, do not leave the load switch on for more than 20 seconds at a time.

This test requires a load tester.

1. To perform this test, the battery must be fully charged.

2. Connect the load tester negative and positive leads to the battery terminals. Then place the load tester’s induction pickup around the Maxi-fuse to voltage regulator red wire (B, Figure 22).

3. Start the engine and slowly bring the speed up to 3000 rpm while reading the load tester scale. With the engine running at 3000 rpm, operate the load tester switch until the voltage scale reads 13.0 volts. The tester should show a regulated (DC) current output reading of 19-23 amps.

4. With the engine still running at 3000 rpm, turn the load off and read the load tester voltage scale. Battery voltage should not exceed 15 volts. Turn the engine off and disconnect the load tester from the motorcycle.

5. Refer to *Alternator* in Chapter Nine and test the stator. If the stator tests acceptable, there is a defective voltage regulator/rectifier or a wiring short circuit. Make sure to eliminate the possibility of a poor connection or damaged wiring before replacing the voltage regulator/rectifier.
Electrical System Current Load Test

*CAUTION*
When using a load tester, refer to the manufacturer’s instructions. To prevent tester damage caused by overheating, do not leave the load switch on for more than 20 seconds at a time.

This test, requiring a load tester, measures the total current load of the electrical system and any additional accessories while the engine is running. Perform this test if the battery is continually discharged, yet the charging system output is within specification.

If aftermarket electrical components have been added to the motorcycle, the increased current demand may exceed the charging system’s capacity and cause a discharged battery.

1. Connect a load tester to the battery per the manufacturer’s instructions.
2. Turn the ignition switch on, but do not start the engine. Then turn on all electrical accessories and switch the headlight beam to HIGH.
3. Read the ampere reading (current draw) on the load tester and compare it to the Charging System Output Test. The charging system output test results (current reading) must exceed the electrical system current load by 3.5 amps for the battery to remain sufficiently charged.
4. If aftermarket accessories have been added to the motorcycle, disconnect them and repeat Step 3. If the electrical system current load is now within the specification, the problem is with the additional accessories.
5. If no accessories have been added to the motorcycle, a short circuit may be causing the battery to discharge.

Battery Current Draw Test

This test measures the current draw on the battery when all electrical systems and accessories are off. Perform this test if the battery does not hold a charge when the motorcycle is not being used. A current draw that exceeds 3.5 mA will discharge the battery. The voltage regulator (0.5 mA), TSM (0.5 mA) and TSSM (2.5 mA) account for a 3.5 mA current draw. The battery must be fully charged to perform this test.

1. Disconnect the negative battery cable as described in Chapter Nine.
2. Connect an ammeter between the negative battery cable end and the ground stud on the engine crankcase as shown in Figure 23.
3. With the ignition switch, lights and all accessories turned off, read the ammeter. If the current exceeds 3.5 mA, continue with Step 4.
4. Refer to the appropriate wiring diagram at the end of this manual. Check the charging system wires and connectors for shorts or other damage.
5. Unplug each electrical connector separately and check for a reduction in the current draw. If the meter reading changes after a connector is disconnected, the source of the current draw has been found. Check the electrical connectors carefully before testing the individual component.
6. After completing the test, disconnect the ammeter and reconnect the negative battery cable.
IGNITION SYSTEM

Precautions

Before testing the ignition system, observe the following precautions to prevent damage to the system.

1. Never disconnect any of the electrical connectors while the engine is running.
2. Apply dielectric grease to all electrical connectors prior to reconnecting them. This will help seal out moisture.
3. Make sure all electrical connectors are free of corrosion and are completely coupled to each other.
4. The ignition module (Figure 24) must always be mounted securely to the mounting bracket under the seat.

Troubleshooting Preparation

1. Refer to the wiring diagram at the end of this manual for the specific model.
2. Check the wiring harness for visible signs of damage.
3. Make sure all connectors are properly attached to each other and locked in place.
4. Check all electrical components for a good ground to the engine.
5. Check all wiring for short circuits or open circuits.
6. Remove the rear fender inner panel as described in Chapter Fourteen.
7. Remove the left side cover and check for a blown ignition circuit fuse (Figure 25).
8. Make sure the fuel tank has an adequate supply of fresh gasoline.
9. Check the spark plug cable routing and the connections at the spark plugs. If there is no spark or only a weak one, repeat the test with new spark plugs. If the condition remains the same with new spark plugs and if all external wiring connections are good, the problem is most likely in the ignition system. If a strong spark is present, the problem is probably not in the ignition system. Check the fuel system.

Ignition Coil Testing

Use an ohmmeter to check the ignition coil secondary and primary resistance. Test the coil twice: first when it is cold (room temperature), then at normal operating temperature. If the engine does not start, heat the coil with a hair dryer, then test with the ohmmeter.

1. Remove the ignition coil as described in Chapter Nine.
2. Measure the ignition coil primary resistance between the primary coil terminals. Refer to Figure 26. Compare the reading to the specification in Table 2. Replace the ignition coil if the reading is not within specification.
3. Measure the resistance between the secondary terminals. Refer to Figure 26. Compare the reading to the specification in Table 2. Replace the ignition coil if the reading is not within specification.

Spark Plug Cable and Cap Inspection

All models are equipped with resistor-type spark plug cables (Figure 27). These cables reduce radio interfer-
ence. The cable’s conductor consists of a carbon-impregnated fabric core material instead of solid wire.

Spark plug cable resistance will increase in a corroded, broken or otherwise damaged cable. Excessive cable resistance will cause engine misfire and other ignition or drivability problems.

When troubleshooting the ignition system, inspect the spark plug cables for:
1. Corroded or damaged connector ends.
2. Breaks in the cable insulation that could allow arcing.
3. Split or damaged plug caps that could allow arcing to the cylinder heads.
4. Replace damaged or questionable spark plug cables.

**ELECTRONIC DIAGNOSTIC SYSTEM**

All models are equipped with an electronic diagnostic system that monitors the operating condition of the speedometer, ignition control module (ICM), turn signal/security module (TSM/TSSM) and tachometer, if so equipped. A serial data bus connects the components. If a malfunction occurs, a diagnostic trouble code (DTC) may be generated.

The DTC identifies an anomaly detected by an electrical component. The trouble code is retained in the memory of the ICM, TSM/TSSM, speedometer and tachometer, if so equipped. A DTC is categorized as current or historic.

A current DTC identifies a problem that affects present motorcycle operation.

A historic DTC identifies a problem that has been resolved either through servicing or a changed condition. Historic DTCs are retained to provide information should an intermittent problem exist. A historic DTC is retained in memory until fifty start/run cycles have occurred, at which point the DTC is erased.

Not all malfunctions cause the generation of a DTC. Refer to *No-DTC Fault*.

**Startup Check**

The diagnostic system indicates a normal condition or an operating problem each time the ignition key is turned on (ignition).

1. During normal startup, the following occurs after the key is turned on:
   a. The check engine symbol (A, Figure 28) illuminates for four seconds, then goes out.
   b. The security symbol (B, Figure 28) illuminates for four seconds, then goes out.

2. Note the following indications of potential problems during startup:
   a. If the check engine symbol or security symbol does not illuminate, an instrument may be faulty. Refer to *Initial Diagnostic Check*.
   b. If the check engine symbol or security symbol illuminates after 20 seconds, a serial data bus problem may exist. Check for a DTC.
   c. If the check engine symbol or security symbol stays on, an instrument may be faulty or a DTC exists. Refer to *Initial Diagnostic Check*.

**DTC Retrieval**

Trouble codes are configured in a five digit format consisting of a letter prefix followed by four numbers.

*NOTE*

*BusEr* is a trouble code which may appear during diagnostic troubleshooting. *BusEr* indicates a problem in the serial bus data circuit.

Two methods may be used to retrieve trouble codes, either through performing the retrieval sequence at the speedometer or using the H-D Digital Technician tool. The following
describes using the speedometer to retrieve DTCs. If necessary, take the motorcycle to a dealership equipped with the H-D Digital Technician.

Perform the following to read a DTC:

**NOTE**

*Make sure the run/stop handlebar switch is in the run position.*

1. Push and hold in the odometer reset button on the back of the speedometer.
2. Turn the ignition key on, then release the reset button. The following should occur:
   a. The speedometer backlighting comes on.
   b. The speedometer needle rotates to full deflection position (A, Figure 29).

**NOTE**

*The security symbol may come on even though the motorcycle is not equipped with a security system.*

3. The message *diag* appears in the odometer window on the speedometer (B, Figure 29).
4. Press and release the odometer reset button. The letters *PSSPt* appear in the odometer window (Figure 30). The letter *P* will flash indicating that information concerning the ICM is obtainable. The letters *PSSPr* identify the following components:
   a. The letter *P* identifies the ICM.
   b. The letter *S* identifies the TSM/TSSM.
   c. The letters *SP* identify the speedometer.
   d. The letter *t* identifies the tachometer.
5. To cycle through the PSSPt letter identifiers, push and quickly release the odometer reset button. The selected component letter identifier will flash.
6. To obtain a DTC, select a component (identifier letter(s) flashes) then push and hold in the odometer reset button for at least 5 seconds. Release the button. The code will appear in the odometer window (Figure 31), or *none*. Record the DTC.

**NOTE**

*When reading codes in Step 7 push in and release the reset button only long enough to retrieve the next code. Holding in the reset button for more than 5 seconds will erase the codes.*

7. Press and release the reset button as needed to read additional trouble codes until *end* appears.

**NOTE**

*On models not equipped with a tachometer, *No Rsp* will appear when the tachometer identifier is selected.*

8. If *none* appears, pushing and releasing the reset button will cause the display of the component part number. For instance, the display may read *Pn 32478-04* for the ICM.
9. Push and release the reset button to return to the PSSPt display.
10. Turn off the ignition key to exit the diagnostic program.

**Diagnostic Tools**

The troubleshooting steps in some of the flowcharts in this chapter require using H-D breakout box part No. HD-42682 (Figure 32) and adapters HD-46601.

The H-D computer program Digital Technician (part No. HD-44750) must be used to read historic DTCs, and to erase them. The Digital Technician is also necessary to reprogram a new ICM.

The H-D breakout box is separated into two panels (black and gray). The panel colors relate to the box connector colors: one pair black and one pair gray.
Refer to the following when connecting the breakout box:
1. Speedometer/tachometer—Refer to Chapter Nine and remove the back of the speedometer or tachometer. Disconnect the connector (Figure 33) and attach the adapters. Connect the black breakout box connectors to the adapters. Use the sockets on the black breakout box panel during testing.
2. TSM/TSSM—Refer to Chapter Nine and remove the TSM/TSSM. Connect the gray breakout box connectors to the TSM/TSSM and to the connector. Use the sockets on the gray breakout box panel during testing. Reinstall the battery.
3. ICM—Remove the seat. Disconnect the ICM connector (Figure 34). Connect the black breakout box connectors to the ICM and to the connector. Use the sockets on the black breakout box panel during testing.

**Data Link Connector**

A data link connector provides access to the data bus and provides a testing terminal when troubleshooting. The connector is located behind the left side cover. Remove the connector cap (Figure 35) for access to the connector terminals.

**DTC Troubleshooting**

A list of DTCs is found in Table 3 at the end of this chapter, which also identifies the possible problem and a troubleshooting flowchart. Refer to the applicable flowchart in Figures 36-60. Note the following before beginning troubleshooting:
1. Before retrieving DTCs, refer to Initial Diagnostic Check in this section.
2. Not all malfunctions will set a DTC. If this occurs, refer to Chapter Nine and the wiring diagrams at the end of this manual to assist in troubleshooting.
3. Check for obvious causes before undertaking what may be a complicated troubleshooting procedure. Look for loose or disconnected connectors, damaged wiring and other possible causes.
4. The DTCs are prioritized according to importance. If multiple DTCs occur, correct the DTC with the highest priority listed in Table 3. It is possible for one fault to trigger more than one DTC.
5. Refer to the wiring diagrams at the end of this manual to identify connectors. Each connector is noted with a corresponding number on the wiring diagram. This connector number is noted in the flow charts. Refer to the appropriate sections in this chapter and Chapter Nine for additional component testing.

**No-DTC fault**

Some malfunctions, such as fuel and starting system problems, do not trigger a DTC. In those cases, the troubleshooting guidelines found in this chapter will serve to locate the problem. However, there are faults that can be diagnosed using the procedures implemented when diagnosing a DTC. The following faults may not generate a DTC, but the specified flowchart will help identify the problem.
1. No spark or ICM power—Figure 55.
2. Tachometer faulty—Figure 56.
3. No security lamp—Figure 57.
4. Security lamp always on—Figure 58.
5. Key fob signal weak to TSSM—Figure 59.
6. Turn signal cancels improperly—Figure 60.

**Initial diagnostic check**

Because the speedometer provides the DTCs, it may be necessary to troubleshoot it before initiating a diagnostic sequence. Check speedometer operation as described, then refer to Figure 36 and follow the Initial Checks flowchart.
1. During normal operation the speedometer should operate as follows when the ignition key is turned on (make sure the run/stop handlebar switch is in the run position):
   a. The speedometer backlighting comes on.

   **NOTE**
   The security symbol may come on even though the motorcycle is not equipped with a security system.
b. The check engine and security symbols illuminate.
c. The odometer display illuminates.

2. If the speedometer performs normally during startup, perform the following WOW test:
   a. Push in the odometer reset button on the back of the speedometer.
   b. Turn the ignition key on and release the odometer reset button.
   c. The speedometer backlighting should come on.
   d. The speedometer needle should rotate to the full deflection position (A, Figure 29).

3. If the speedometer operates abnormally, check the wiring for the battery, ground, ignition, odometer reset switch and accessories.

**NOTE**
The security symbol may come on even though the motorcycle is not equipped with a security system.

e. The check engine, battery and security symbols should illuminate.
f. The message diag should appear in the odometer window on the speedometer (B, Figure 29).

**FUEL SYSTEM**

**WARNING**
Gasoline is highly flammable. When servicing the fuel system, work in a well-ventilated area. Do not expose gasoline and gasoline vapors to sparks or other ignition sources.

Begin fuel system troubleshooting with the fuel tank and work through the system, reserving the carburetor as the final point. Most fuel system problems result from an empty fuel tank, a plugged fuel filter or fuel valve, old fuel, a dirty air filter or clogged carburetor jets. Do not assume the carburetor is the problem. Unnecessary carburetor adjustment can compound the problem.

**Running Conditions**

Refer to the following conditions to identify whether the engine is running lean or rich.

**Rich**

1. Fouled spark plugs.
2. Engine misfires and runs rough under load.
3. Excessive exhaust smoke as the throttle is increased.
4. An extreme rich condition causes a choked or dull sound from the exhaust and an inability to clear the exhaust with the throttle held wide open.

**Lean**

1. Blistered or very white spark plug electrodes.
2. Engine overheats.
3. Slow acceleration and engine power is reduced.
4. Flat spots on acceleration that are similar in feel to when the engine starts to run out of gas.
5. Engine speed fluctuates at full throttle.
Engine starts and runs.
Check for DTCs.

Engine starts, but stalls.
Refer to appropriate troubleshooting section in this chapter.

Engine turns, but does not start.
Refer to appropriate troubleshooting section in this chapter.

Engine will not turn over.
Refer to appropriate troubleshooting section in this chapter.

DTC appears.
Diagnostic mode would not display.
Refer to DTC list in Table 3.

Follow steps as outlined in DTC Retrieval section in this chapter. Speedometer backlighting should appear and odometer display should illuminate.

OK.
Go to Step A.

No display or backlighting.
Connect breaker box to speedometer. Check for continuity between breaker box black terminal 7 and ground while wiggling the harness.

Continuity.
Check for battery voltage at breaker box black terminal 5 while wiggling the harness. Is battery voltage constant?

OK.

No continuity.
Find and repair open wiring.

No battery voltage.

(continued)
Make sure ignition key is OFF. Disconnect speedometer connector (Figure 39). Check for continuity between breaker box black terminals 8 and 11. Tester should indicate continuity when odometer reset button is pressed and infinity when released.

**OK.**

Incorrect results.

**Replace speedometer.**

**Replace odometer reset button switch.**

**STEP A**

Turn ignition switch key to ON. Odometer panel should illuminate.

**OK.**

No odometer illumination.

**Perform WOW test in Speedometer Check section.**

**OK.**

Fails WOW test.

Check for battery voltage at breakerbox black terminal 1.

**OK.**

No battery voltage.

**Replace speedometer.**

Check instrument fuse.

**Fuse blown.**

**Fuse OK.**

No back lighting.

**OK.**

Go to Step B.

Check for battery voltage at breaker box black terminal 6.

**OK.**

No battery voltage.

**Find and repair open wiring.**
(continued)

- Replace speedometer.
- Check accessory fuse.
- Locate and repair cause of fuse blowing.
- Find open between terminal 1 of speedometer connector 39 and fuse. Repair wire.

STEP B

Is problem intermittent?

- If yes, repeat diagnostic checks while wiggling harness and connectors.
- Problem continues.
- Find and repair intermittent cause.

- No intermittent problem. Speedometer does not function.
- Remove and inspect vehicle speed sensor (VSS) (Chapter Nine).
- Clean and re-install VSS. Recheck.
- VSS OK. Check wiring and connectors.
- OK.
- Faulty wiring or connector.
- Replace speedometer.

- No intermittent problem. Tachometer does not function.
- Check tachometer (Chapter Nine).

Tachometer does not function.

Problem continues.

OK.

Faulty wiring or connector.

Replace speedometer.

Find and repair faulty wiring or connector.
**DTC B1006, B1007: ACCESSORY OR IGNITION LINE OVERVOLTAGE**

1. Make sure battery charger is connected.
   - If so, disconnect battery charger.
   - Clear DTCs.
   - Start engine, run at 3000 rpm for 5 seconds. Check for DTC.
     - DTC appears.
       - Troubleshoot charging system.
     - No DTC.
       - System OK.
   - No battery charger connected.
     - Troubleshoot charging system.

**DTC B1008: RESET SWITCH CLOSED**

1. Remove odometer reset button rubber boot. Clear DTC. Check for DTC.
   - DTC appears.
     - Make sure ignition key is OFF. Disconnect speedometer connector (39). Check for resistance between breaker box black terminals 8 and 11. Tester should indicate less than 1 ohm when odometer reset button is pressed and infinity when released.
       - Test OK.
         - Replace speedometer.
       - Incorrect tester reading.
         - Replace reset switch.
     - No DTC.
       - Replace switch boot.
NOTE: This procedure applies to loss of serial data communication between the ICM and speedometer. Refer to Figure 40 for DTC U1016 and U1255 related to the ICM and TSM/TSSM.

Check for ICM part number during speedometer diagnostics check. Refer to Step 8 in DTC Retrieval section.

Part number appears.

Connect breaker box to speedometer. Check for continuity between breaker box black terminal 2 and terminal 12 of the ICM connector (10) while wiggling harness.

Continuity exists.

Clear DTCs. Test ride. Retrieve DTCs.

DTC U1016 appears.

Replace ICM.

DTC U1016 does not appear.

System OK.

No continuity.

Repair light green/violet wire.

No part number or No Resp is displayed.

Connect breaker box to speedometer. Check for continuity between breaker box black terminal 2 and terminal 12 of the ICM connector (10).

Continuity exists.

Replace ICM.

No continuity.

Repair open in light green/violet wire.

Clear DTCs. Test ride. Retrieve DTCs.

DTC U1016 appears.

Replace ICM.
NOTE: This procedure applies to loss of serial data communication between the ICM and TSM/TSSM. Refer to Figure 39 for DTC U1016 and U1255 related to the ICM and speedometer.

DTC U1016, U1255: LOSS OF ICM SERIAL DATA

Check for ICM part number during speedometer diagnostics check. Refer to Step 8 in DTC Retrieval section.

Part number appears.

Turn ignition key to OFF. Connect breakout box to ICM and connector (30). Remove TSM/TSSM and connect breakout box to TSM/TSSM and connector (30). Check for continuity between breakout box black terminal 12 and gray terminal 3 while wiggling harness.

Continuity exists.

Clear DTCs. Test ride. Retrieve DTCs.

DTC U1016 appears.

Replace ICM.

No continuity.

Repair light green/violet wire.

DTC U1016 does not appear.

System OK.

No part number or No Rsp is displayed.

Turn ignition key to OFF. Connect breakout box to ICM and connector (30). Remove TSM/TSSM and connect breakout box to TSM/TSSM and connector (30). Check for continuity between breakout box black terminal 12 and gray terminal 3 while wiggling harness.

Continuity exists.

Replace ICM.

No continuity.

Repair open in light green/violet wire.
DTC U1064, U1255: LOSS OF TSM/TSSM SERIAL DATA

Check for TSM/TSSM part number during speedometer diagnostics check. Refer to Step 8 in DTC Retrieval section.

Part number appears.

Connect breaker box to speedometer and TSM/TSSM. Check for continuity between breaker box black terminal 2 and gray terminal 3 while wiggling harness.

Continuity exists.

Clear DTCs. Test ride. Retrieve DTCs.

DTC U1064 appears.

Replace ICM.

DTC U1064 does not appear.

System OK.

No continuity.

Repair light green/violet wire.

No part number or No Rsp is displayed.

Connect breaker box to speedometer and TSM/TSSM. Check for continuity between breaker box black terminal 2 and gray terminal 3.

Continuity exists.

Replace TSM/TSSM.

No continuity.

Repair open in light green/violet wire.
DTC U1300, U1301, BUS ER: SERIAL DATA LOW OR SERIAL DATA OPEN/HIGH

Check for DTCs.

DTCs P1009 and P1010 appear. Refer to Figure 52 and Figure 53.

DTCs U1300 or U1301 appear.

Bus Er appears. Speedometer does not communicate with other modules.

Bus Er appears. Inspect intake manifold for leaks.

No DTCs appear.

Go to Step A.

DTCs U1300 or U1301 appear.

Bus Er appears. Speedometer does not communicate with other modules.

Leaks found.

No leaks found.

Repair seals or intake manifold.

Replace ICM.

STEP A

Turn ignition key to ON (run/stop switch in RUN).

Bus Er appears.

Turn ignition key to OFF. Disconnect ICM connector (10). Turn ignition key to ON.

Bus Er does not appear.

Turn ignition key to OFF. Wiggle harness and check for continuity between terminal 3 of data link connector (91) and ground.

Bus Er appears.

Turn ignition key to OFF. Disconnect TSM/TSSM connector (30). Reinstall battery. Turn ignition key to ON.

Bus Er does not appear.

Continuity present.

Find and repair short to ground.

No continuity.

Replace ICM.

(continued)
Bus Er appears.  
Bus Er does not appear.  
Voltage present.  
No voltage.  

If equipped with a tachometer, turn ignition key to OFF. Disconnect tachometer connector (108) in tachometer housing. Turn ignition key to ON.  
If not equipped with a tachometer, proceed as follows.  
Replace TSM/TSSM.

If equipped with a tachometer, turn ignition key to OFF. Disconnect tachometer connector (108) in tachometer housing. Turn ignition key to ON.  
If not equipped with a tachometer, proceed as follows.  
Replace tachometer.

Bus Er appears.  
Bus Er does not appear.  
Replace tachometer.

Turn ignition key to OFF. Disconnect speedometer connector (39). Check for continuity between terminal 3 of data link connector (91) and ground.  
Continuity to ground.  
No continuity.  

Find and repair short to ground.  
Turn ignition switch to ON. Check for voltage at terminal 3 of data link connector (91).  
Voltage present.  
No voltage.  

Remove fuses individually to isolate shorted circuit, then repair.  
Replace speedometer.
DTC U1300, U1301, BUS ER: ENGINE STARTS, THEN STALLS

NOTE: If problem is not resolved, refer also to Figure 42.

- Check for DTCs.
  - DTCs P1009 and P1010 appear. Refer to Figure 52 and Figure 53.
  - DTCs U1300 or U1301 appear.
  - Bus Er appears. Speedometer does not communicate with other modules.
  - No DTCs appear.
    - Inspect intake manifold for leaks.
    - Leaks found.
      - Repair seals or intake manifold.
    - No leaks found.
      - Replace ICM.

Turn ignition key to OFF. Connect breakout box to ICM and connector (30). Remove TSM/TSSM and connect breakout box to TSM/TSSM and connector (30). Check for continuity between terminal 2 of data link connector (91) and box black terminal 5. Check for continuity between terminal 3 of data link connector and box black terminal 12. Check for continuity between terminal 4 of data link connector (91) and gray terminal of ignition fuse.

- Continuity exists.
  - Turn ignition key to OFF. Disconnect ICM connector (30). Verify that TSM/TSSM information appears during speedometer diagnostics check. Refer to Step 8 in DTC Retrieval section.
- No continuity.
  - Repair open circuits.

(continued)
TSM/TSSM information appears.

Replace ICM.

No TSM/TSSM information.

Turn ignition key to OFF. Disconnect TSM/TSSM connector (30). Check for continuity between terminal 3 of data link connector and ground.

Continuity exists.

Repair short circuit to ground.

No continuity.

Turn ignition switch to ON. Check for voltage at terminal 3 of data link connector (91).

Voltage present.

Repair voltage short.

No voltage.

Replace TSM/TSSM. Recheck operation.

Operation OK.

System OK.

Abnormal operation.

Turn ignition key to OFF. Disconnect speedometer connector (39). Recheck operation.

Operation OK.

Replace speedometer.

Abnormal operation.

Replace tachometer, if so equipped.
DTC B1121, B1122, B1141: TURN SIGNALS WILL NOT FLASH; 4-WAY FLASHERS INOPERABLE

1. Turn ignition key to ON.
2. Turn signals on continuously.
   - Turn ignition key to OFF. Remove TSM/TSSM connector (30). Connect breakout box to TSM/TSSM connector (30), but not to TSM/TSSM. Reinstall battery. Turn ignition key to ON. Check for battery voltage at breakout box gray terminal 5 (left turn signals) or gray terminal 6 (right turn signals).
   - Battery voltage present.
     - Find and repair short.
   - Battery voltage not present.
     - No battery voltage.
       - Replace TSM/TSSM.
3. Turn signals not on.
   - Operate 4-way flasher.
   - Lamps illuminate.
     - Go to Step A.
   - Lamps not on.
     - Check TSM/TSSM connector (30).
     - Connector OK.
       - Mate connector correctly.
     - Faulty connection.
4. (continued)
Battery voltage present.  
Go to Step C.

No battery voltage.  
Check for voltage at ignition fuse.

Battery voltage present.  
Repair open circuit in gray wire between ignition fuse and TSM/TSSM.  
Go to Figure 55.

No battery voltage.

STEP A

Inspect inoperable bulb(s).

Bulb(s) OK.

Turn ignition key to OFF. Remove TSM/TSSM connector (30). Connect breakout box to TSM/TSSM connector (30), but not to TSM/TSSM. Reinstall battery. Connect a jumper wire between breakout box gray terminal 1 and gray terminal 6.

Both right side turn signals illuminate.

Connect a jumper wire between breakout box gray terminal 1 and gray terminal 5.

Both left side turn signals illuminate.

Left side turn signals do not illuminate.

Right side turn signals do not illuminate.

Check for continuity between breakout box gray terminal 6 and lamps.

Continuity exists.

No continuity.

Faulty bulb(s).

Replace.

(continued)
Go to Step D.

Check for continuity between breakout box gray terminal 5 and lamps.

- Continuity exists.
  - Repair open ground circuit.
- No continuity.
  - Repair open between TSM/TSSM connector (30) and lamps.

Repair open ground circuit.

STEP B

Turn ignition key to OFF. Disconnect the TSM/TSSM connector (30). Connect breakout box to TSM/TSSM connector (30), but not to TSM/TSSM. Reinstall battery. Check resistance between breakout box gray terminal 12 and ground.

- Resistance less than 1 ohm.
  - Check for battery voltage at both 15 amp battery fuse terminals.
    - Voltage present at both terminals.
      - Repair open in brown/gray wire between TSM/TSSM and battery fuse.
    - No voltage.
      - Repair ground circuit.
- Resistance greater than 1 ohm.
  - Repair ground circuit.

(continued)
44 (continued)

**STEP C**

Replace fuse.

Repair open circuit between fuse block and 30 amp Maxi-fuse.

Turn ignition key to OFF. Disconnect TSM/TSSM connector (30). Connect breakout box to TSM/TSSM and connector (30). Reinstall battery. Turn ignition key to ON. Check for battery voltage at breakout box gray terminal 7 when right turn signal button is depressed.

Battery voltage present.

Check for battery voltage at breakout box gray terminal 8 when left turn signal button is depressed.

Battery voltage present.

Go to Step A.

No voltage.

Remove fuel tank and connect breakout box and adapters between right handlebar switch connectors (22). Turn ignition switch to ON. Check voltage at breakout box black terminal 5 when right turn signal button is depressed.

Battery voltage present.

Repair open circuit between TSM/TSSM and right handlebar switch connector (22).

No voltage.

Turn ignition switch to OFF. Check for continuity between breakout box black terminal 5 and ground.

(continued)
Repair open circuit between TSM/TSSM and left handlebar switch connector (24).

Turn ignition switch to OFF. Check for continuity between breakout box black terminal 5 and ground.

Repair shorted circuit to ground.

Turn ignition key to ON. Check for battery voltage at breakout box black terminal 1.

Battery voltage present.

Replace turn signal switch.

No continuity.

No voltage.

Battery voltage present.

Replace turn signal switch.

No continuity.

No voltage.

Repair open circuit between fuse block and right handlebar switch connector (22).

(continued)
STEP D

Verify that correct turn signal bulbs are installed.

Correct bulbs installed. Incorrect bulbs installed.

Inspect bulbs and sockets for corrosion.

Correct bulbs installed. Incorrect bulbs installed.

Replace bulb. Check operation.

Corrosion present. No corrosion.

Clean bulbs and sockets. Check operation.

Operation OK. System OK.

Abnormal operation. Replace bulb. Check operation.

Corrosion present. No corrosion.

Check for corrosion on all lamp terminals.

Clean corroded wires and terminals. Check operation.

Operation OK. System OK.

Abnormal operation. Replace lamp assembly.

Replace TSM/TSSM.
Disconnect alarm siren connector (142). Turn ignition key to ON. Measure voltage between black wire terminal and brown/gray wire terminal.

- **Battery voltage present.**
  - Turn ignition key to OFF. Disconnect TSM/TSSM connector (30). Connect breakout box to TSM/TSSM connector (30), but not to TSM/TSSM. Check resistance between breakout box gray terminal 11 and light green/brown wire terminal in siren connector.
    - Less than 1 ohm.
      - Check resistance between breakout box gray terminal 11 and chassis ground.
        - Less than 1 ohm.
          - Repair grounded light green/brown wire.
        - Greater than 1 ohm.
          - Repair open in light green/brown wire.
    - Greater than 1 ohm.
      - Repair open in light green/brown wire.

- **No voltage.**
  - Turn ignition key to OFF. Disconnect TSM/TSSM connector (30). Connect breakout box to TSM/TSSM connector (30), but not to TSM/TSSM. Check resistance between breakout box gray terminal 12 and black wire terminal in siren connector.
    - Less than 1 ohm.
      - With siren connector (142) disconnected, measure resistance between siren terminals B and C.
        - Resistance reading is 120k-200k ohms.
          - Install siren on a motorcycle with a known good system and check operation.
            - Siren does not operate.
              - Replace siren.
            - Siren operates.
              - Replace TSM/TSSM.
        - Resistance reading is not 120k-200k ohms.
          - Replace siren.
    - Greater than 1 ohm.
      - No continuity.
### DTC B1134: STARTER OUTPUT HIGH

1. Turn ignition key to OFF. Remove starter relay (Chapter Nine). Disconnect TSM/TSSM connector (30). Connect breakout box to TSM/TSSM connector (30), but not to TSM/TSSM. Reinstall battery. Turn ignition key to ON. Check for battery voltage at breakout box gray terminal 9.

   - **Battery voltage present.** Repair short in tan/green wire.
   - **No voltage.** Install starter relay. Check for battery voltage at breakout box gray terminal 9.

### DTC U1097, U1255: LOSS OF SPEEDOMETER OR TSM/TSSM SERIAL DATA

1. Make sure TSM/TSSM part number appears during speedometer diagnostics check. Refer to Step 8 in DTC Retrieval section.

   - **Part number appears.**
   - **No part number or No Rsp is displayed.**

   a. Turn ignition key to OFF. Connect breakout box to speedometer connector (39). Disconnect TSM/TSSM and connect breakout box to TSM/TSSM connector (30). Check for continuity between breaker box black terminal 2 and gray terminal 3 while wiggling harness.

      - **Continuity exists.** Clear DTCs. Test ride. Retrieve DTCs.
      - **No continuity.** Repair light green/violet wire.

   b. Turn ignition key to OFF. Connect breakout box to speedometer connector (39). Disconnect TSM/TSSM and connect breakout box to TSM/TSSM connector (30). Check for continuity between breaker box black terminal 2 and gray terminal 3.

      - **Continuity exists.** Repair light green/violet wire.
      - **No continuity.** Replace speedometer.
Turn ignition key to OFF. Connect breakout box to ICM and connector (30). Measure voltage between black box terminals 4 (negative) and 11 (positive). With ignition key at ON specified voltages are:
1. Engine stopped: 4.2-4.95 volts.
2. Engine running at hot idle: 1.5-3.0.

Voltage readings OK.

Perform voltage readings while wiggling harness to check for faulty wiring or terminals.

Intermittents found.

Repair faulty circuit.

DTC P0106, P0107 or P0108 appear.

Replace ICM.

No DTCs appear.

System OK.

No intermittents found.

Replace MAP sensor, road test and check for DTCs.

Incorrect voltage readings.

Go to Step A.

(continued)
Disconnect the MAP sensor connector (80). Turn the ignition key to ON. Measure voltage at outer connector terminals (A & C).

- **Voltage is 5.0 volts.**
  - Turn ignition key to OFF. Disconnect breakout box from ICM, but not from the ICM connector (10). Measure resistance between MAP connector (80) middle terminal (B) and black box terminal 11.
  - Resistance less than 1 ohm.
    - Measure resistance between MAP connector (80) middle terminal (B) and chassis ground.
    - Resistance greater than 1 ohm.
      - Repair open in violet/white wire.
      - Resistance less than 1 megohm.
        - Replace MAP sensor.
      - Resistance greater than 1 megohm.
        - Repair grounded violet/white wire.
    - Continuity exists.
  - Resistance greater than 1 ohm.
    - Repair open in violet/white wire.
    - Resistance less than 1 megohm.
      - Replace MAP sensor.
    - Resistance greater than 1 megohm.
      - Repair grounded violet/white wire.

- **Voltage greater than 6.0 volts.**
  - Repair short to 12 volts in red/white wire.
  - Resistance less than 1 ohm.
    - Measure resistance between MAP connector (80) middle terminal (B) and chassis ground.
    - Resistance greater than 1 ohm.
      - Repair open in violet/white wire.
      - Resistance less than 1 megohm.
        - Replace MAP sensor.
      - Resistance greater than 1 megohm.
        - Repair grounded violet/white wire.
    - Continuity exists.
  - Resistance greater than 1 ohm.
    - Repair open in violet/white wire.
    - Resistance less than 1 megohm.
      - Replace MAP sensor.
    - Resistance greater than 1 megohm.
      - Repair grounded violet/white wire.

- **Voltage less than 4.5 volts.**
  - Turn ignition key to OFF. Disconnect breakout box from ICM, but not from the ICM connector (10). Measure resistance between MAP connector (80) middle terminal (B) and black box terminal 11.
  - Resistance less than 1 ohm.
    - Measure resistance between MAP connector (80) middle terminal (B) and chassis ground.
    - Resistance greater than 1 ohm.
      - Repair open in violet/white wire.
      - Resistance less than 1 megohm.
        - Replace MAP sensor.
      - Resistance greater than 1 megohm.
        - Repair grounded violet/white wire.
    - Continuity exists.
  - Resistance greater than 1 ohm.
    - Repair open in violet/white wire.
    - Resistance less than 1 megohm.
      - Replace MAP sensor.
    - Resistance greater than 1 megohm.
      - Repair grounded violet/white wire.

- **Voltage greater than 6.0 volts.**
  - Repair short to 12 volts in red/white wire.
  - Resistance less than 1 ohm.
    - Measure resistance between MAP connector (80) middle terminal (B) and chassis ground.
    - Resistance greater than 1 ohm.
      - Repair open in violet/white wire.
      - Resistance less than 1 megohm.
        - Replace MAP sensor.
      - Resistance greater than 1 megohm.
        - Repair grounded violet/white wire.
    - Continuity exists.
  - Resistance greater than 1 ohm.
    - Repair open in violet/white wire.
    - Resistance less than 1 megohm.
      - Replace MAP sensor.
    - Resistance greater than 1 megohm.
      - Repair grounded violet/white wire.

- **Voltage less than 4.5 volts.**
  - Turn ignition key to OFF. Disconnect breakout box from ICM, but not from the ICM connector (10). Check continuity between MAP connector terminal (A) and black box terminal 4. Check continuity between MAP connector terminal (C) and black box terminal 3.
  - Continuity exists.
    - Disconnect the MAP connector (80) from the breakout box. Measure resistance between black box terminals 3 & 5.
    - Resistance less than 1 megohm.
      - Replace ICM.
    - Resistance greater than 1 megohm.
      - Repair short between red/white wire and ground wire.
    - No continuity.
      - Repair open wire.
  - Resistance greater than 1 ohm.
    - Repair open in violet/white wire.
    - Resistance less than 1 megohm.
      - Replace MAP sensor.
    - Resistance greater than 1 megohm.
      - Repair grounded violet/white wire.

- **Voltage greater than 6.0 volts.**
  - Repair short to 12 volts in red/white wire.
  - Resistance less than 1 ohm.
    - Measure resistance between MAP connector (80) middle terminal (B) and chassis ground.
    - Resistance greater than 1 ohm.
      - Repair open in violet/white wire.
      - Resistance less than 1 megohm.
        - Replace MAP sensor.
      - Resistance greater than 1 megohm.
        - Repair grounded violet/white wire.
    - Continuity exists.
  - Resistance greater than 1 ohm.
    - Repair open in violet/white wire.
    - Resistance less than 1 megohm.
      - Replace MAP sensor.
    - Resistance greater than 1 megohm.
      - Repair grounded violet/white wire.

- **Voltage less than 4.5 volts.**
  - Turn ignition key to OFF. Disconnect breakout box from ICM, but not from the ICM connector (10). Check continuity between MAP connector terminal (A) and black box terminal 4. Check continuity between MAP connector terminal (C) and black box terminal 3.
  - Continuity exists.
    - Disconnect the MAP connector (80) from the breakout box. Measure resistance between black box terminals 3 & 5.
    - Resistance less than 1 megohm.
      - Replace ICM.
    - Resistance greater than 1 megohm.
      - Repair short between red/white wire and ground wire.
    - No continuity.
      - Repair open wire.
  - Resistance greater than 1 ohm.
    - Repair open in violet/white wire.
    - Resistance less than 1 megohm.
      - Replace MAP sensor.
    - Resistance greater than 1 megohm.
      - Repair grounded violet/white wire.
Disconnect the MAP sensor connector (80). Turn the ignition key to ON. Measure voltage at outer connector terminals (A and C).

- **Voltage is 5.0 volts.**
  - Turn ignition key to OFF. Disconnect breakout box from ICM, but not from the ICM connector (10). Measure resistance between MAP connector (80) middle terminal (B) and black box terminal 11.
    - Resistance less than 1 ohm.
      - Measure resistance between MAP connector (80) middle terminal (B) and chassis ground.
      - Resistance greater than 1 megohm.
        - Replace MAP sensor.
    - Resistance greater than 1 ohm.
      - Measure resistance between MAP connector (80) middle terminal (B) and chassis ground.
      - Repair grounded violet/white wire.

- **Voltage greater than 6.0 volts.**
  - Repair short to 12 volts in red/white wire.

- **Voltage less than 4.5 volts.**
  - Turn ignition key to OFF. Disconnect breakout box from ICM, but not from the ICM connector (10). Check continuity between MAP connector terminal (A) and black box terminal 4. Check continuity between MAP connector terminal (C) and black box terminal 3.
    - Continuity exists.
      - Disconnect the MAP connector (80) from the breakout box. Measure resistance between black box terminals 3 & 5.
      - Resistance greater than 1 megohm.
        - Replace ICM.
      - Resistance less than 1 megohm.
        - Repair short between red/white wire and ground wire.
    - No continuity.
      - Repair open wire.
Repair shorted red or black wire. Replace CKP sensor. Repair as needed. Measure AC volts at black box terminals 8 and 9 while cranking engine.

- Voltage at least 1 volt.
  - Check for intermittent voltage.
    - Intermittent voltage present. Repair circuit.
    - Voltage OK. Replace CKP sensor. Clear codes and retest.
      - Code P0371, P0372 or P0374 appears. Replace ICM.
      - No codes appear.

- Voltage less than 1 volt.
  - Measure AC volts at CKP sensor connector (79) terminals while cranking engine.
    - Voltage at least 1 volt.
      - Check for continuity between CKP sensor connector (79) red wire terminal and ICM connector red wire terminal.
        - Continuity exists.
          - System OK.
        - No continuity.
          - Repair open black wire.
    - Voltage less than 1 volt.
      - Replace CKP sensor.

DTC P0501, P0502: VEHICLE SPEED SENSOR (VSS)

Remove, inspect and reinstall VSS (Chapter Nine). Clear any DTCs. Ride motorcycle at least 1 mile. Check for DTCs.

DTCs appear.

Turn ignition key to OFF. Disconnect VSS connector (65). Check for continuity between connector red/white wire terminal and ground.

Continuity exists.

Repair shorted red/white wire.

No continuity.

Turn ignition key to OFF. Connect breakout box to ICM and connector (10). Check for continuity between black box terminal 3 and VSS connector red/white wire terminal.

Continuity exists.

Check for continuity between black box terminal 4 and VSS connector (65) black wire terminal.

No continuity.

Repair open red/white wire between VSS and ICM connector (10).

No DTCs.

System OK.

(continued)
Continuity exists.  
No continuity.

Repair open black wire between VSS and ICM connector (10).

Check for continuity between black box terminal 10 and VSS connector (65) white/green wire terminal.

Continuity exists.  
No continuity.

Raise motorcycle so rear wheel can be turned by hand. Turn ignition key to ON. Check for voltage at black box terminal 10. Voltmeter should alternately read 0-1 volts when VSS passes a gear tooth and 4-6 volts when no gear tooth is near.

Voltage OK.  
Incorrect readings. Battery voltage indicated.

Replace ICM.

Incorrect readings.  
No voltage.

Repair shorted white/green wire.

Turn ignition key to OFF. Measure resistance between black box terminal 10 and ground.

Resistance is less than 100 ohms.  
Resistance is greater than 100 ohms.

Replace ICM.

Replace VSS.
Verify that charging system operates properly. Refer to tests in this chapter.

**Charging system OK.**

Turn ignition key to OFF. Connect breakout box to ICM and connector (10). Turn ignition key to ON. Measure voltage drop between positive battery terminal and black box terminal 1 (negative).

**Voltage drop is greater than 0.5 volt.**

Turn ignition key to ON. Measure voltage drop between positive battery terminal and black box terminal 4 (negative).

**Voltage drop is greater than 0.5 volt.**

Turn ignition key to ON. Measure voltage drop between negative battery terminal and black box terminal 5 (positive).

**Voltage drop is 0.5 volt or less.**

Repair bad connection.

**Voltage drop is 0.5 volt or less.**

Problem is intermittent. Wiggle circuit components to find fault.

(continued)
Voltage drop is greater than 0.5 volt.

Check for loose wires or corrosion at engine stop switch connector. If OK, replace switch.

Turn ignition key to ON. Measure voltage drop between positive battery terminal and gray wire terminal of ignition fuse.

Voltage drop is greater than 0.5 volt.

Turn ignition key to ON. Measure voltage drop between positive battery terminal and red/black wire terminal of ignition fuse.

Voltage drop is greater than 0.5 volt.

Turn ignition key to ON. Measure voltage drop between positive battery terminal and terminal A of Maxi-fuse.

Voltage drop is 0.5 volt or less.

Repair or replace gray wire or terminal.

Voltage drop is 0.5 volt or less.

Replace fuse or terminals.

(continued)
Voltage drop is greater than 0.5 volt.

Turn ignition key to ON. Measure voltage drop between positive battery terminal and terminal B of Maxi-fuse.

Voltage drop is greater than 0.5 volt.

Replace wire of terminals causing high resistance.

Voltage drop is 0.5 volt or less.

Replace ignition switch or terminals.

Voltage drop is 0.5 volt or less.

Replace Maxi-fuse.

---

**DTC P1009: INCORRECT PASSWORD**

Perform password learning procedure in Chapter Nine.

DTC P1009 appears.

Replace TSM/TSSM.

No DTC P1009.

System OK.

No DTC P1009.

System OK.

DTC P1009 appears.

Install original TSM/TSSM. Replace ICM.
DTC P1010: MISSING PASSWORD

Check for DTCs with U prefix.

U DTC appears.

Troubleshoot U DTC with lowest number.

Continuity exists.

Repair short to ground.

Voltage exists.

Repair short to voltage.

Continuity exists.

Replace TSM/TSSM.

System OK.

No U DTC appears.

Turn ignition key to OFF. Disconnect ICM connector (10). Check for continuity between terminal 3 of data link connector (91) and ground.

No continuity.

Check for battery voltage at terminal 3 of data link connector (91).

No voltage.

Turn ignition key to OFF. Connect breakout box to ICM and connector (10). Check for continuity between black box terminal 12 and terminal 3 of data link connector (91).

No continuity.

Repair open circuit.

System faulty.

Install original TSM/TSSM. Replace ICM.

Troubleshoot U DTC with lowest number.

System OK.

System faulty.

Install original TSM/TSSM. Replace ICM.
NOTE: This procedure uses H-D tools Ignition Coil Circuit Test Adapter (part No. HD-44687) and Fuel Injector Test Lamp (part No. HD-34730-2C).

Turn ignition key to OFF. Disconnect ignition coil connector (83). Measure voltage at white/black wire connector terminal. Be sure engine stop switch is in the RUN position. Turn ignition switch to ON.

Voltage equals battery voltage in first two seconds after ignition switch is ON.

Install Ignition Coil Circuit Test Adapter and Fuel Injector Test Lamp in black box terminals 1 and 6 to check front cylinder coil. To check rear cylinder coil, install testers in black box terminals 1 and 7. Crank engine and observe test lamp.

Voltage does not equal battery voltage in first two seconds after ignition switch is ON.

Repair open white/black wire circuit.

Test lamp flashes.

Measure primary coil resistance as described in Chapter Nine.

Test lamp does not flash.

Replace ICM.

Correct test results.

Incorrect test results.

Replace ignition coil.

(continued)
Turn ignition key to OFF. Connect breakout box to ICM and connector (10). For DTCs P1351 and P1352, measure resistance between black box terminal 6 and blue/orange wire terminal in ignition coil connector (83). For DTCs P1354 and P1355, measure resistance between black box terminal 7 and yellow/blue wire terminal in ignition coil connector (83).

- **Resistance is less than 0.5 ohms.**
  - Wiggle wires and re-check resistance.
  - Intermittent test results.
  - Repair circuit.

- **Resistance is 0.5 ohms or more.**
  - Repair open circuit.
  - Check continuity to ground from black box terminal 6 (front coil) and black box terminal 7 (rear coil).
    - **Continuity exists.**
      - Repair short circuit to ground.
    - **No continuity.**
      - Check for voltage at black box terminal 6 (front coil) and black box terminal 7 (rear coil).
        - **Voltage exists.**
          - Repair short to voltage.
        - **No voltage.**
          - Replace ICM.

No intermittents found. Check continuity to ground from black box terminal 6 (front coil) and black box terminal 7 (rear coil).

Continuity exists. Repair short circuit to ground.

No continuity. Check for voltage at black box terminal 6 (front coil) and black box terminal 7 (rear coil).

Voltage exists. Repair short to voltage.

No voltage. Replace ICM.
NO SPARK OR ICM POWER

Check ignition fuse.

Fuse OK.

Turn ignition key to OFF. Connect breakout box to ICM and connector (10). Turn ignition key to ON. Measure voltage at black box terminals 1 and 5.

Voltage is 11-13 volts.

Replace ICM.

Voltage is less than 11 volts.

Turn ignition key to OFF. Check continuity between black box terminal 5 and ground.

Continuity exists.

Check continuity between black box terminal 1 and white/black wire terminal in main harness end of engine stop switch connector (22).

Continuity exists.

With engine stop switch in RUN position, check continuity between white/black wire terminal and gray wire terminal in switch end of engine stop switch connector (22).

Continuity exists.

Repair open in gray wire circuit.

No continuity.

Replace engine stop switch.

No continuity.

Repair open black wire circuit.

Replace fuse and determine cause.
NOTE: The green and orange symbols in the initial test represent cruise (green) and pursuit (orange) functions on models other than Sportsters.

Perform WOW test in speedometer check section. The following should occur:
1. Backlighting comes on.
2. Needle rotates to full deflection.
3. Both green and orange symbol LEDs illuminate.

Test OK.

Faulty test.

Connect breaker box to speedometer and connector (39). Measure voltage at black box terminal 1.

Intermittents found.

No intermittents.

Battery voltage present.

No voltage.

Check instrument fuse.

Fuse blown.

Repair cause. Replace fuse.

Fuse OK.

Repair open in orange wire circuit.

Turn ignition key to OFF. Check for continuity between breaker box black terminals 2 and 7.

(continued)
Continuity present.
Check for continuity between breaker box black terminal 7 and ground while wiggling harness.

Continuity present.
Check for battery voltage at breaker box black terminal 5 while wiggling harness.

Voltage continuous.
Check for battery voltage at breaker box black terminal 6.

Battery voltage present.
Replace tachometer.

No voltage.
Repair open in orange/white wire circuit.

No continuity.
Repair open in light green/violet wire circuit.

No continuity.
Repair open in black wire circuit.

Voltage intermittent.
Repair open in brown/gray wire circuit.
NOTE: This chart applies to motorcycles equipped with the security system.

Make sure engine stop switch is in RUN. Attempt to start engine.

Engine cranks. Engine does not crank.

Turn ignition key to OFF. Connect breakout box to speedometer and connector (39). Remove TSM/TSSM (Chapter Nine) and connect breakout box to TSM/TSSM and connector. Check for continuity between breakout box black terminal 4 and gray terminal 4.

Continuity present. No continuity.

Check for continuity between breaker box black terminal 4 and ground. Repair open in brown/violet wire circuit.

Continuity present. No continuity.

Repair short to ground in brown/violet wire circuit. Disconnect breakout box and reconnect speedometer connector (39). Connect a jumper wire between gray box terminal 4 and positive battery terminal.

(continued)
Security symbol illuminates.  
Replace TSM/TSSM.

Security symbol does not light.  
Replace speedometer.

**STEP A**

Be sure TSM/TSSM connector (30) is fully engaged and attempt to start engine.

Engine does not crank.  
Turn ignition key to OFF. Remove TSM/TSSM (Chapter Nine) and connect breakout box to TSM/TSSM and connector (30). Check for battery voltage between breakout box gray terminal 1 (positive) and gray terminal 12 (negative).

Battery voltage present.  
Check for battery voltage between breakout box gray terminal 2 (positive) and gray terminal 12 (negative).

No voltage.  
Go to Step B.

Engine cranks.  
System OK.

(continued)
(continued)

Battery voltage present.  
No voltage.  
Replace TSM/TSSM.

Check for voltage at ignition fuse terminals.

Battery voltage present.  
No voltage.  
Repair open in gray wire circuit.

Go to Figure 55.

STEP B

Turn ignition key to OFF. Check for resistance between breakout box gray terminal 12 and ground.

Resistance less than 1 ohm.  
Check for battery voltage at both terminals of battery fuse.

Resistance 1 ohm or more.  
Repair faulty ground.

Battery voltage present at both terminals.  
Repair open in brown/gray wire circuit.

No voltage at one terminal.  
Replace fuse.

No voltage at either terminal.  
Repair open in red wire circuit.
SECURITY SYMBOL ON CONTINUOUSLY

Turn ignition key to ON. Security symbol should illuminate for 4 seconds, then go out for 4 seconds.

- Operates properly.
- Check for DTCs.
- Security symbol remains on.

Turn ignition key to OFF. Disconnect TSM/TSSM connector (30). Reinstall battery. Turn ignition key to ON.

- Security symbol illuminates.
- Security symbol does not illuminate.

- Turn ignition key to OFF. Disconnect speedometer connector (39). Turn ignition key to ON. Check for voltage at brown/violet wire terminal on speedometer connector (39).

- Voltage exists.
  - Repair short to battery voltage in brown/violet wire circuit.

- No voltage.
  - Replace speedometer.

- Replace TSM/TSSM.

CycleTech

SECURITY SYMBOL ON CONTINUOUSLY
NOTE: At least two attempts are required for the TSSM to recognize the new fob.

WEAK OR NO KEY FOB SIGNAL TO TSSM

Verify key fob applies to motorcycle.

Check left turn signal operation.

- Operates properly.
- Malfunction.

Replace fob battery and retest.

- Fob operates properly.
  - System OK.
- Fob malfunctions.
  - Assign a new fob. See NOTE.

Fob malfunctions.

Assign a new fob. See NOTE.

- Fob operates properly.
  - System OK.
- Fob malfunctions.
  - Replace TSM/TSSM.
NOTE: The following troubleshooting requires H-D Speedometer tester (part No. HD-41354).

1. Make sure TSM/TSSM is installed properly.
2. Make sure TSM/TSSM is configured for solo (not sidecar) operation.
3. Remove TSM/TSSM and reconnect connector (30). Reinstall battery. Activate 4-way flashers. Verify that 4-way flashers cancel when TSM/TSSM is tilted at least 45 degrees in both directions (as if mounted in bike).

   - Operates properly.
   - Operates improperly.

   1. Disconnect VSS connector (65). Connect speedometer tester to VSS and connector (65). Connect jumper wire between terminal B of tester and white/green wire terminal of VSS connector (65). Connect jumper wire between terminal C of tester and black wire terminal of VSS connector (65). Operate turn signals. Turn ignition key to ON (engine stop switch must be in the RUN position). Set tester so speedometer indicates greater than 20 mph. Key number 528 into tester. Turn signals should cancel after 20 flashes.

   - Replace TSM/TSSM.

(continued)
Turn signals cancel after 20 flashes.

Operates improperly.

Check speedometer operation.

Speedometer indicates road speed.

Replace TSM/TSSM.

Speedometer does not indicate road speed.

Troubleshoot speedometer.

Turn ignition key to OFF. Remove TSM/TSSM and connect breakout box to TSM/TSSM and connector (30). Reinstall battery. Turn ignition key to ON. Check for voltage as follows:

1. While depressing right turn signal switch, check for voltage at gray box terminals 7 and 12. Wiggle harness and note fluctuations.

2. While depressing left turn signal switch, check for voltage at gray box terminals 8 and 12. Wiggle harness and note fluctuations.
Voltage fluctuates.

Repair open in circuit.

No voltage fluctuations.

Turn ignition key to ON. Check for voltage as follows:
1. With right turn signal switch released, check for voltage at gray box terminals 7 and 12. Wiggle harness and note fluctuations.
2. With left turn signal switch released, check for voltage at gray box terminals 8 and 12. Wiggle harness and note fluctuations.

Voltage fluctuates.

No voltage fluctuations.

Turn ignition key to OFF. Check for continuity as follows:
1. While depressing right turn signal switch, check for continuity between gray box terminals 7 and 12. Wiggle harness and note fluctuations.
2. While depressing left turn signal switch, check for continuity between gray box terminals 8 and 12. Wiggle harness and note fluctuations.

Continuity exists.

Repair short in circuit.

No continuity.

System OK.
CARBURETOR TROUBLESHOOTING

Hard starting
- Fuel overflow from float assembly
- Enrichment system inoperative
- Plugged pilot jet and/or passage
- Fuel overflow

Fuel overflows
- Incorrect fuel level
- Damaged float assembly
- Worn float needle valve or dirty seat
- Incorrect float alignment
- Damaged float bowl O-ring or loose float bowl mounting screws
- Plugged vent in fuel tank cap
- Incorrect fuel tank cap installed

Poor idling
- Incorrect idle speed
- Plugged pilot jet system
- Loose pilot jet
- Air leak at carburetor mounting
- Enrichment valve nut loose or damaged

Poor acceleration
- Fuel level too low
- Clogged fuel passages
- Clogged jets
- Plugged vent in fuel tank cap
- Incorrect fuel tank cap installed (non-vent type)
- Enrichment valve nut loose or damaged
- Worn or damaged needle jet or needle
- Throttle cable misadjusted
- Air leak at carburetor mounting
- Damaged vacuum piston

Poor power at low engine speeds
- Incorrect idle speed adjustment
- Contaminated air filter element
- Damaged vacuum piston
- Worn or damaged needle jet or needle
- Clogged pilot jet system
- Plugged vent in fuel tank cap
- Enrichment valve nut loose or damaged
- Clogged fuel supply
- Air leak at carburetor mounting
Troubleshooting

Isolate fuel system problems to the fuel tank, fuel shut-off valve and filter, fuel hoses, external fuel filter (if used) or carburetor. In the following procedures, it is assumed that the ignition system is working properly.

Refer to Figure 61 for possible causes of fuel system problems.

**Fuel level system**

The fuel level system is shown in Figure 62. Proper carburetor operation depends on a constant and correct carburetor fuel level. As fuel is drawn from the float bowl during engine operation, the float level in the bowl drops. As the float drops, the fuel valve moves from its seat and allows fuel to flow through the seat into the float bowl. Fuel entering the float bowl causes the float to rise and push against the fuel valve. When the fuel level reaches a predetermined level, the fuel valve is pushed against the seat to prevent the float bowl from overfilling.

If the fuel valve fails to close, the engine will run too rich or flood with fuel. Symptoms of this problem are rough running, excessive black smoke and poor acceleration. This condition sometimes clears up when the engine is run at wide-open throttle and the fuel is being drawn...
into the engine before the float bowl can overfill. However, as the engine speed is reduced, the rich running condition returns.

Several things can cause fuel overflow. In most instances, a small piece of dirt is trapped between the fuel valve and seat, or the float level is incorrect. If fuel is flowing out of the overflow tube connected to the bottom of the float bowl, the fuel valve inside the carburetor is being held open. First check the position of the fuel shutoff valve lever. Turn the fuel shutoff valve lever off. Then lightly tap on the carburetor float bowl and turn the fuel shutoff valve lever on. If fuel stops running out of the overflow tube, whatever was holding the fuel valve off of its seat has been dislodged. If fuel continues to flow from the overflow tube, remove and service the carburetor. See Chapter Eight.

**NOTE**

Fuel will not flow from the vacuum-operated fuel shutoff valve until the engine is running.

**Starting enrichment (choke) system**

A cold engine requires a rich mixture to start and run properly. On all models, a cable-actuated starter enrichment valve is used for cold starting.

If the engine is difficult to start when cold, check the starting enrichment (choke) cable adjustment as described in Chapter Three.

**Accelerator pump system**

During sudden acceleration, the diaphragm type accelerator pump system (Figure 63) provides additional fuel to the engine. Without this system, the carburetor would not be able to provide a sufficient amount of fuel.

The system consists of a spring-loaded neoprene diaphragm that is compressed by the pump lever during sudden acceleration. This causes the diaphragm to force fuel from the pump chamber, through a check valve and into the carburetor venturi. The diaphragm spring returns the diaphragm to the uncompressed position, which allows the chamber to refill with fuel.

If the engine hesitates during sudden acceleration, check the operation of the accelerator pump system. Carburetor service is covered in Chapter Eight.

**Vacuum-operated fuel shutoff valve testing**

All models are equipped with a vacuum-operated fuel shutoff valve. A vacuum hose is connected between the fuel shutoff valve diaphragm and the carburetor. When
the engine is running, vacuum is applied to the fuel shutoff valve through this hose. For fuel to flow through the fuel valve, a vacuum must be present with the fuel shutoff valve handle in the on or reserve position. A Miti-Vac hand-operated vacuum pump (Figure 64), gas can, drain hose that is long enough to reach from the fuel valve to the gas can, and hose clamp are required for this test.

1. Disconnect the negative battery cable as described in Chapter Nine.
2. Visually check the amount of fuel in the tank. Add fuel if necessary.
3. Turn the fuel shutoff valve (A, Figure 65) off and disconnect the fuel hose (B) from the fuel shutoff valve. Plug the open end of the hose.
4. Connect the drain hose to the fuel shutoff valve and secure it with a hose clamp. Insert the end of the drain hose into a gas can.
5. Disconnect the vacuum hose from the fuel shutoff valve.
6. Connect a hand-operated vacuum pump to the fuel shutoff valve vacuum hose nozzle.
7. Turn the fuel shutoff valve on.

CAUTION
In Step 8, do not apply more than 25 in. (635 mm) Hg vacuum or the fuel shutoff valve diaphragm will be damaged.

8. Apply 25 in. (635 mm) Hg of vacuum to the valve. Fuel should flow through the fuel shutoff valve when the vacuum is applied.
9. With the vacuum still applied, turn the fuel shutoff valve lever to the reserve position. Fuel should continue to flow through the valve.
10. Release the vacuum and make sure the fuel flow stops.
11. Repeat Steps 8-10 five times. Fuel should flow with vacuum applied and stop flowing when the vacuum is released.
12. Turn the fuel shutoff valve off. Disconnect the vacuum pump and drain hoses.
13. Reconnect the fuel hose (B, Figure 65) to the fuel shutoff valve.
14. If the fuel valve failed this test, replace the fuel shutoff valve as described in Chapter Eight.

ENGINE NOISES

1. Knocking or pinging during acceleration can be caused by using a lower octane fuel than recommended or a poor grade of fuel. Incorrect carburetor jetting and an incorrect spark plug heat range (too hot) can cause pinging. Refer to Spark Plugs in Chapter Three. Also check for excessive carbon buildup in the combustion chamber or a defective ignition module.
2. Slapping or rattling noise at low speed or during acceleration can be caused by excessive piston-to-cylinder wall clearance. Also check for a bent connecting rod(s) or worn piston pin and/or piston pin hole in the piston(s).
3. Knocking or rapping during deceleration is usually caused by excessive rod bearing clearance.
4. Persistent knocking and vibration or other noises are usually caused by worn main bearings. If the main bearings are in good condition, consider the following:
   a. Loose engine mounts.
   b. Cracked frame.
   c. Leaking cylinder head gasket(s).
   d. Exhaust pipe leak at cylinder head(s).
   e. Stuck piston ring(s).
   f. Broken piston ring(s).
   g. Partial engine seizure.
   h. Excessive connecting rod bearing clearance.
   i. Excessive connecting rod side clearance.
   j. Excessive crankshaft runout.
5. Rapid on-off squeal indicates a compression leak around the cylinder head gasket or spark plug.

6. For valve train noise, check for the following:
   a. Bent pushrod(s).
   b. Defective lifter(s).
   c. Valve sticking in guide.
   d. Worn cam gears and/or cam.
   e. Damaged rocker arm or shaft. Rocker arm may be binding on shaft.

**ENGINE LUBRICATION**

An improperly operating engine lubrication system quickly leads to engine damage. The engine oil tank should be checked weekly and the tank refilled as described in Chapter Three.

Oil pump service is covered in Chapter Five.

**Oil Light**

The oil light, mounted on the indicator light panel (Figure 66), will come on when the ignition switch is turned on before starting the engine. After starting the engine, the oil light should go off when the engine speed is above idle.

If the oil light does not come on when the ignition switch is turned on and the engine is not running, check for a burned out oil light bulb. If the bulb is good, check the oil pressure switch (Figure 67) as described in Chapter Nine.

If the oil light remains on when the engine speed is above idle, turn the engine off and check the oil level in the oil tank as described in Chapter Three. If the oil level is satisfactory, check the following:

1. Oil may not be returning to the tank from the return line. Check for a clogged or damaged return line or a damaged oil pump.
2. If operating the motorcycle in conditions where the ambient temperature is below freezing, ice and sludge may be blocking the oil feed pipe. This condition will prevent the oil from circulating properly.

**Oil Consumption High or Engine Smokes Excessively**

1. Worn valve guides.
2. Worn valve guide seals.
3. Worn or damaged piston rings.
4. Restricted oil tank return line.
5. Oil tank overfilled.
6. Oil filter restricted.
7. Leaking cylinder head surfaces.

**Excessive Engine Oil Leaks**

1. Clogged air filter breather hose.
2. Restricted or damaged oil return line to oil tank.
3. Loose engine parts.
4. Damaged gasket sealing surfaces.
5. Oil tank overfilled.

**CLUTCH**

All clutch troubles, except adjustments, require partial clutch disassembly to identify and repair the problem. Refer to Chapter Six for clutch service procedures.

**Clutch Chatter or Noise**

This problem is generally caused by worn or warped friction and steel plates. Also check for worn or damaged bearings.

**Clutch Slip**

1. Incorrect clutch adjustment.
2. Worn friction plates.
3. Weak or damaged diaphragm spring.
4. Damaged pressure plate.

**Clutch Drag**

1. Incorrect clutch adjustment.
2. Warped clutch plates.
3. Worn or damaged clutch shell or clutch hub.
Transmission symptoms are sometimes hard to distinguish from clutch symptoms. Refer to Chapter Seven for transmission service procedures. Make sure the clutch is not causing the trouble before working on the transmission.

Jumping Out of Gear
1. Incorrect shifter pawl adjuster.
2. Worn or damaged shifter parts.
4. Excessively worn or damaged gears.

Difficult Shifting
1. Worn or damaged shift forks.
2. Loose or damaged detent plate.
3. Worn or damaged shifter shaft assembly.
4. Worn or damaged detent arm.
5. Worn shift fork drum groove(s).
6. Loose, worn or damaged shifter fork pin(s).
7. Damaged shifter shaft splines.

Excessive Gear Noise
1. Worn or damaged bearings.
2. Worn or damaged gears.
3. Excessive gear backlash.

EXCESSIVE VIBRATION
Excessive vibration is usually caused by loose engine mounting hardware. High speed vibration may be due to a bent axle shaft or loose or faulty suspension components. Vibration can also be caused by the following conditions:
1. Broken frame.
2. Excessively worn primary chain.
3. Tight primary chain links.

SUSPENSION AND STEERING
Poor handling may be caused by improper pressure, a damaged or bent frame or front steering components, worn wheel bearings or dragging brakes. Possible causes for suspension and steering malfunctions are listed below.

Irregular or Wobbly Steering
1. Loose wheel axle nut(s).
2. Loose or worn steering head bearings.
3. Excessive wheel hub bearing play.
4. Damaged cast wheel.
5. Spoke wheel out of alignment.
6. Unbalanced wheel assembly.
7. Worn hub bearings.
8. Incorrect wheel alignment.
9. Bent or damaged steering stem or frame (at steering neck).
10. Tire incorrectly seated on rim.
11. Heavy front end loading from non-standard equipment.

Stiff Steering
1. Low front tire air pressure.
2. Bent or damaged steering stem or frame (at steering neck).
3. Loose or worn steering head bearings.

Stiff or Heavy Fork Operation
1. Incorrect fork springs.
2. Incorrect fork oil viscosity.
3. Excessive amount of fork oil.

Poor Fork Operation
1. Worn or damaged fork tubes.
2. Fork oil capacity low due to leaking fork seals.
3. Bent or damaged fork tubes.
5. Incorrect fork springs.
6. Heavy front end loading from non-standard equipment.
Poor Rear Shock Absorber Operation

1. Weak or worn springs.
2. Damper unit leaking.
3. Shock shaft worn or bent.
4. Incorrect rear shock springs.
5. Rear shocks adjusted incorrectly.
6. Heavy rear end loading from non-standard equipment.
7. Incorrect loading.

Spongy Brake Feel

This problem is generally caused by air in the hydraulic system. Bleed and adjust the brakes as described in Chapter Thirteen.

Brake Drag

Check brake adjustment, looking for insufficient brake pedal and/or hand lever free play. Also check for worn, loose or missing parts in the brake calipers. Check the brake disc for warpage or excessive runout.

Brakes Squeal or Chatter

Check brake pad thickness and disc condition. Make sure the pads are not loose; check that the anti-rattle springs are properly installed and in good condition. Clean off any dirt on the pads. Loose components can also cause this. Check for:
1. Warped brake disc.
2. Loose brake disc.
3. Loose caliper mounting bolts.
4. Loose front axle nut.
5. Worn wheel bearings.
6. Damaged hub.

Table 1 STARTER SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brush length (minimum)</td>
<td>0.443 in. (11.0 mm)</td>
</tr>
<tr>
<td>Commutator diameter (minimum)</td>
<td>1.141 in. (28.98 mm)</td>
</tr>
<tr>
<td>Commutator runout (maximum)</td>
<td>0.016 (0.41 mm)</td>
</tr>
<tr>
<td>Current draw</td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>160-200 amps</td>
</tr>
<tr>
<td>Maximum</td>
<td>250 amps</td>
</tr>
<tr>
<td>Maximum no-load speed at 11.5 volts</td>
<td></td>
</tr>
<tr>
<td>Minimum no-load current at 11.5 volts</td>
<td>90 amps</td>
</tr>
<tr>
<td></td>
<td>3000 rpm</td>
</tr>
</tbody>
</table>

Table 2 ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery capacity</td>
<td>12 volt, 12 amp hr.</td>
</tr>
<tr>
<td>Ignition coil</td>
<td></td>
</tr>
<tr>
<td>Primary resistance</td>
<td>0.5-0.7 ohms</td>
</tr>
<tr>
<td>Secondary resistance</td>
<td>5500-7500 ohms</td>
</tr>
<tr>
<td>Alternator</td>
<td></td>
</tr>
<tr>
<td>Stator coil resistance</td>
<td>0.2-0.4 ohms</td>
</tr>
<tr>
<td>AC voltage output</td>
<td>19-26 Vac per 1000 rpm</td>
</tr>
<tr>
<td>Voltage regulator</td>
<td></td>
</tr>
<tr>
<td>Voltage output</td>
<td>14.3-14.7 VDC at 75° F</td>
</tr>
<tr>
<td>Amps at 3600 rpm</td>
<td>22 amps</td>
</tr>
<tr>
<td>DTC</td>
<td>Problem</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>BusEr</td>
<td>Serial data bus fault</td>
</tr>
<tr>
<td>B0563</td>
<td>Battery voltage high</td>
</tr>
<tr>
<td>B1006</td>
<td>Accessory line overvoltage</td>
</tr>
<tr>
<td>B1007</td>
<td>Ignition line overvoltage</td>
</tr>
<tr>
<td>B1008</td>
<td>Reset switch closed</td>
</tr>
<tr>
<td>B1121</td>
<td>Left turn output fault</td>
</tr>
<tr>
<td>B1122</td>
<td>Right turn output fault</td>
</tr>
<tr>
<td>B1131</td>
<td>Alarm output low</td>
</tr>
<tr>
<td>B1132</td>
<td>Alarm output high</td>
</tr>
<tr>
<td>B1134</td>
<td>Starter output high</td>
</tr>
<tr>
<td>B1135</td>
<td>Accelerometer fault</td>
</tr>
<tr>
<td>B1141</td>
<td>Ignition switch open/lown</td>
</tr>
<tr>
<td>B1151</td>
<td>Ignition switch open/lown</td>
</tr>
<tr>
<td>B1153</td>
<td>Ignition switch open/lown</td>
</tr>
<tr>
<td>P0106</td>
<td>MAP sensor rate-of-change error</td>
</tr>
<tr>
<td>P0107</td>
<td>MAP sensor failed open/low</td>
</tr>
<tr>
<td>P0108</td>
<td>MAP sensor failed high</td>
</tr>
<tr>
<td>P0371</td>
<td>CKP shorted low</td>
</tr>
<tr>
<td>P0372</td>
<td>CKP shorted high</td>
</tr>
<tr>
<td>P0374</td>
<td>CKP not detected/cannot synchronize</td>
</tr>
<tr>
<td>P0501</td>
<td>VSS failed low</td>
</tr>
<tr>
<td>P0502</td>
<td>VSS failed high/open</td>
</tr>
<tr>
<td>P0562</td>
<td>System voltage low</td>
</tr>
<tr>
<td>P0563</td>
<td>System voltage high</td>
</tr>
<tr>
<td>P0602</td>
<td>Calibration memory error</td>
</tr>
<tr>
<td>P0603</td>
<td>EEPROM memory error</td>
</tr>
<tr>
<td>P0604</td>
<td>RAM memory error</td>
</tr>
<tr>
<td>P0605</td>
<td>Program memory error</td>
</tr>
<tr>
<td>P0607</td>
<td>A to D error</td>
</tr>
<tr>
<td>P1009</td>
<td>Incorrect password</td>
</tr>
<tr>
<td>P1010</td>
<td>Missing password</td>
</tr>
<tr>
<td>P1351</td>
<td>Ignition coil driver front low/open</td>
</tr>
<tr>
<td>P1352</td>
<td>Ignition coil driver front high/shorted</td>
</tr>
<tr>
<td>P1354</td>
<td>Ignition coil driver rear low/open</td>
</tr>
<tr>
<td>P1355</td>
<td>Ignition coil driver rear high/shorted</td>
</tr>
<tr>
<td>U1016</td>
<td>Loss of ICM serial data</td>
</tr>
<tr>
<td>U1064</td>
<td>Loss of TSM/TSSM serial data</td>
</tr>
<tr>
<td>U1097</td>
<td>Loss of speedometer serial data</td>
</tr>
<tr>
<td>U1255</td>
<td>Loss of ICM or TSM/TSSM serial data</td>
</tr>
<tr>
<td>U1300</td>
<td>Serial data low</td>
</tr>
<tr>
<td>U1301</td>
<td>Serial data open/high</td>
</tr>
</tbody>
</table>

1. Priority numbers are relative. There may be more than one DTC for a specific priority number due to differing systems, such as engine management and TSM/TSSM.

2. Follow the troubleshooting procedures for the charging system in this chapter.

3. Replace the TSM/TSSM due to an internal malfunction.

4. Not applicable to Sportster models. If DTC appears, reconfigure TSM/TSSM.

5. Replace the ICM due to an internal malfunction.
HARLEY-DAVIDSON PARTS & ACCESSORIES
Click on links below

Harley Davidson Dyna Models Parts & Accessories
Harley Davidson Softail Parts & Accessories
Harley Davidson Sportster Parts & Accessories
Harley Davidson 500 & 750 Street Parts & Accessories
Harley Davidson Touring Models Parts & Accessories
Harley Davidson Trike Parts & Accessories
Harley Davidson V-Rod Parts & Accessories
Harley Davidson Closeout Parts & Accessories
Closeout Motorcycle Helmets
Closeout Motorcycle Jackets
Japanese Motorcycle Original Equipment Parts
Dirt Bike Parts & Accessories
Save On All Harley Motorcycle Tires
Cycle Gear – Free Shipping
Free Shipping On All Motorcycles
Discount Auto Parts – Free Shipping

www.ClassicCycles.org